FISHERY MARKET NEWS

JANUARY 1940

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FISHERY MARKET NEWS

A REVIEW OF CONDITIONS AND TRENDS OF THE COMMERCIAL FISHERIES

January 1940 Washington, D. C. Vol. 2, No. 1

SUMMARY

Fish meal manufacture.--Available data indicate that the world production of fish meal exceeds one million tons annually. The elimination of waste in fish meal manufacture, preventing oxidation of the meal, and improvement in methods of grading fish meals are important problems of the industry.

Shark fishery.--Hides, shark meal, fins, liver oil, and shark teeth are marketed from sharks taken in the South Atlantic States.

Federal fish hatchery output.--More than seven and one-half billions of fish and fish eggs were produced in the 102 Federal hatcheries which operated during the fiscal year ending June 30, 1939.

New England vessel landings.--Landings at the ports of Boston, Gloucester, and Portland during November increased 4 percent in quantity and 31 percent in value as compared with the same month in 1938. Vessel landings at the three ports during the first 11 months of 1939 totaled 357,635,000 pounds, valued at $8,738,000.

Chicago Wholesale Fish Market.--Lake trout, halibut, and shrimp were the leading fishery products received by Chicago dealers during November.

Seattle vessel landings.--Failure of the Puget Sound chum run caused increased demand for sablefish. Landings of the latter species during November totaled 872,000 pounds, an increase of 156 percent as compared with the same month in 1938.

Frozen Fish

Domestic holdings of frozen fishery products totaled 92,718,000 pounds on December 15, an increase of 2 percent as compared with the same date a year ago. Whiting, halibut, salmon, mackerel, haddock fillets, pollock fillets, and shrimp were the principal items held. During the month ending December 15, cold-storage plants in the United States and Alaska froze 21,549,000 pounds of fish and shellfish, an increase of 37 percent as compared with the same period last year. Stocks of frozen pollock fillets in Boston cold-storage warehouses totaled 3,116,000 pounds on December 27, an increase of 108 percent as compared with the holdings 4 weeks earlier.

Canned Fish

Unsold stocks of canned salmon in the hands of packers on December 31 were 23 percent less than on the same date in 1938. Wholesale prices for canned salmon quoted by Seattle salmon brokers show a sharp increase over a year ago.

Shrimp canners used more than 56 million pounds of raw shrimp in packing 1,048,000 cases of canned shrimp from July 1 to December 23, 1939. California firms packed 734,000 cases of sardines during November, bringing the pack for the first three months of the current season to 1,286,000 cases, an increase of 31 percent as compared with the same period a year ago. The pack of canned tuna in California during the first 11 months of 1939 was 24 percent greater than in the same period in 1938. California canners packed slightly more mackerel during 1939 than in the previous year.

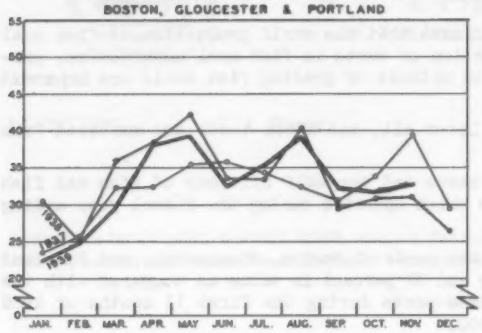
Foreign Trade

Imports of edible fishery products during November 1939 totaled 28,350,000 pounds, a decrease of 14 percent as compared with the same month in 1938. Receipts of canned crab meat were unusually large and accounted for 9 percent of the total. During the first 11 months of 1939 imports of edible fishery products were 16 percent greater than those for the same period in 1938. Domestic exports of edible fishery products during November, consisting principally of canned sardines and salmon, totaled 12,117,000 pounds.

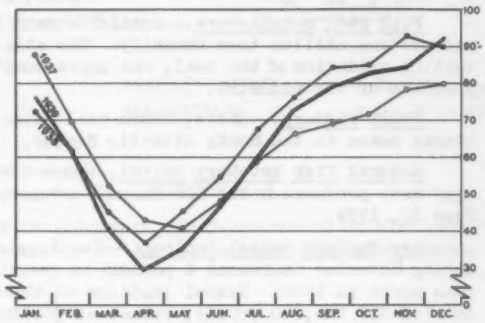
TRENDS OF FISHERY TRADE

In millions of pounds

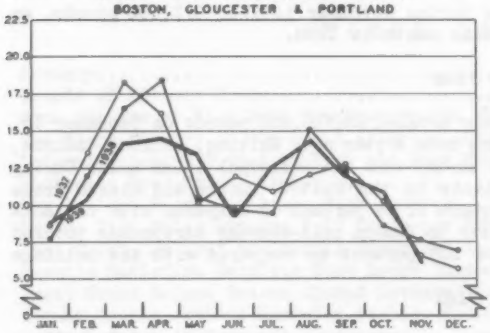
VESSEL LANDINGS, ALL FRESH FISH
BOSTON, GLOUCESTER & PORTLAND



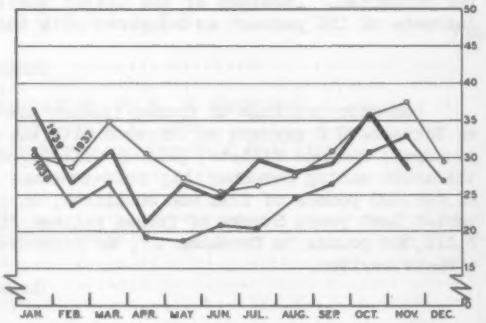
DOMESTIC COLD-STORAGE HOLDINGS OF FROZEN FISH



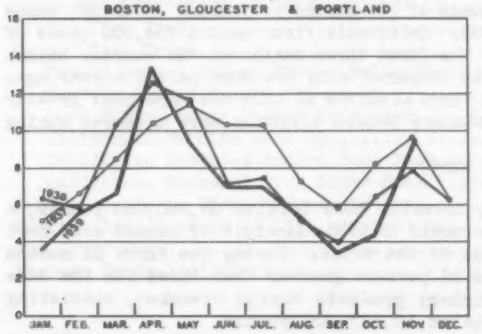
VESSEL LANDINGS, FRESH HADDOCK
BOSTON, GLOUCESTER & PORTLAND



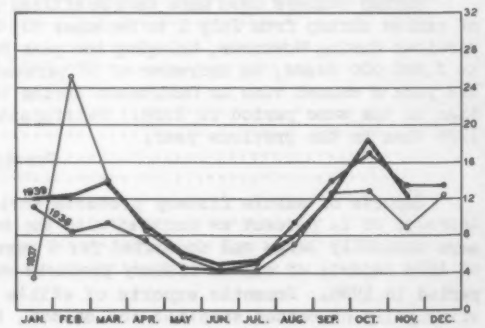
IMPORTS OF EDIBLE FISHERY COMMODITIES



VESSEL LANDINGS, FRESH COD
BOSTON, GLOUCESTER & PORTLAND



EXPORTS OF EDIBLE FISHERY COMMODITIES



SOME ASPECTS OF FISH MEAL MANUFACTURE AND DISTRIBUTION

By R. W. Harrison, Technologist in Charge
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Fish meal is one of the most important fishery products in world commerce. The total annual production in countries for which statistics are available exceeds 1,000,000 tons valued at approximately $30,000,000. In order to produce this quantity of meal, reduction industries utilize at least 12,000,000,000 pounds of whole fish and fish trimmings each year and the demand for raw materials thus created provides incentive for some of the largest commercial fisheries in the world. About 80 to 90 percent of the world supply of fish meal is prepared from fish taken in countries bordering the Pacific Ocean.

Generally speaking, it is not economically feasible to reduce fish for the sole purpose of making meal, unless the raw material is available at very low cost. Therefore, except in the utilization of certain types of fish waste, fish meal is prepared from fatty fish in conjunction with the manufacture of fish oil. The process in practically all cases consists of cooking the raw material, pressing the cooked mass, separating the oil from the expressed liquids, and dehydrating the pressed residue. Equipment and methods vary from wood-fired cooking kettles, crude hand-manipulated presses, skimming vats, and sun drying, to continuous steam cookers, presses, centrifugal oil separators, rotary steam and hot air driers, grinders and conveyors, power driven and synchronized so as to permit treatment from raw material to finished product without interruption or having to be handled by man. North American and European countries have been most aggressive in developing and adopting mechanized equipment, but increasing amounts of meal are now being prepared in modern plants in all countries.

The advancement made in reduction methods has been confined largely to improving the efficiency and increasing the capacity of basic equipment and to the introduction of labor-saving methods. The fundamental principles of the reduction process, however, have remained unchanged; therefore, there are a number of aspects of fish meal manufacture which are of common interest regardless of the degree of refinement of the equipment.

Whole fish and fish trimmings of the type utilized in the manufacture of fish meal normally have an oil-free solids content of about 19 to 23 percent. The other 77 to 81 percent may be accounted for as moisture and oil. As a general rule, when fish vary in fatness, there is a corresponding and inverse variation in moisture content; thus, regardless of the degree of fatness, the proportion of protein and bone material in the whole remains relatively constant. The potential yield of meal after relatively complete oil removal should be about 400 to 475 pounds per ton of raw material. In actual practice the average yield is about 325 to 400 pounds.

The differential between actual and potential yield is due to the fact a considerable amount of nitrogenous material passes into solution during the cooking process and subsequently is discarded in the "stick" water along with varying amounts of fine suspended solids material. Analyses of "stick" water show that the proportion of original raw material discarded as suspended solids and soluble material normally ranges from 1 to 5 percent and 15 to 20 percent, respectively. Cooking and pressing also remove certain vitamin factors, presumably belonging to the vitamin B complex. At least one of these factors, riboflavin, is known to have an important role in nutrition and its loss during reduction detracts from the potential versatility of the meal when used as a protein concentrate in animal rations.

During recent years the meat packing industry has largely discontinued the tankage process of handling slaughterhouse waste, a method similar to that used in fish reduction, and has adopted dry rendering. In the dry rendering procedure the raw material is first dehydrated and the liberated fat is then expressed from the dry residue. Loss of any type of water-soluble extractive is eliminated and the raw material entering the process is recovered completely as finished products. Unfortunately, the method does not lend itself as readily to fish reduction as it does to the handling of meat products.

Manufacture of fish meal and fish oil is strictly a seasonal operation seldom lasting more than a few months. Under these circumstances it is desirable that the equipment used

permit high capacity without an excessive investment which lies idle seven to nine months during the year. The modern fish meal plant meets this requirement much better than a dry rendering plant because moisture can be removed more rapidly and with less cost by cooking to coagulate protein and pressing out the liberated moisture than by depending entirely upon evaporation.

The dry rendering process is subject to another disadvantage in that heating fish flesh and fish oil in contact with metal during the course of dehydration normally causes serious discoloration of the oil. Experimental work in our laboratories has indicated the possibility of minimizing this difficulty but in view of the higher manufacturing costs mentioned above and the existing investment in present equipment, the dry rendering process is seriously handicapped when considered as a means of increasing fish meal recovery.

Inasmuch as the dry rendering method has not appeared to be a practical solution of the problem, a few members of the American industry are giving attention to methods of recovering stick water losses. One procedure is to concentrate the stick water to a thick syrup in multiple effect evaporators, mix the concentrate with the press cake and then dry the mixture in the usual manner in which the resultant meal contains the original nitrogenous components and vitamins subject to any alteration occurring during the recovery process. Concentrated stick waters are being added to cooked fish material and possibly to other feed material in the preparation of canned foods for pets and fur-bearing animals. Concentrated stick waters also are being spray dried in commercial experiments and the properties of the dry products are being investigated. Because of the relatively high riboflavin content of stick waters, the concentrate and dried flour are potential vitamin concentrates for inclusion with fish meal and other feeds in preparing balanced rations for poultry and animal feeding. It is also possible that the concentrated or dehydrated material may be found to have utility for inclusion in technical products. The progress which has been made is admirable but because of the factsthat additional and expensive equipment is required and the operator is in effect assuming a new operation which must be carried on simultaneously with the basic reduction process, adoption of such recovery methods is proceeding slowly.

It is known that protein materials are subject to various physico-chemical phenomena. For example, the solubility of protein materials varies with hydrogen ion concentration and for each protein there is a pH range in which it is least soluble. Proteins may be precipitated from solutions by electrolytes, particularly polyvalent salts or salts of heavy metals, by so-called alkaloidal reagents and various other chemical coagulants. It is possible, therefore, to materially decrease the tendency of fish proteins to go into solution during cooking by pretreatment with coagulating or precipitating agents under controlled conditions. This method of approach to the problem of stick water losses is of interest because its purpose is preventative and the principles involved could be applied in conjunction with existing equipment without appreciably altering operating procedure. Its success, however, would be dependent upon cost, effectiveness, and whether or not the treatment had any detrimental effect on the nutritive value of the resultant meal.

In the preparation of fish meal from fatty fish, it is not possible, by the methods being used, to obtain a complete separation of the oil from the flesh. Accordingly, practically all fish meals contain some oil, the greater majority having an oil content varying between 5 and 12 percent. The presence of the oil in fish meal offers a number of serious obstacles and contributes to some of the most aggravating situations associated with fish reduction.

Fish oils are, as a general rule, rather highly unsaturated compounds which combine readily with oxygen of the air. On account of this fact, fish meals containing oils are subject to oxidation during manufacture, immediately thereafter, and during subsequent storage. The rate of oxidation is so great immediately following grinding that the meal heats spontaneously and unless precautionary measures are taken the degree of heating in some cases may become sufficiently great to cause the meal to catch fire.

In normal practice the dried unground material emerging from the drier is either spread in a thin layer on the floor for 24 to 48 hours before being ground to meal or it is ground and bagged immediately and the bags are set on end on the floor in minimum contact with one another and allowed to stand 24 to 72 hours before being tightly stowed in piles or loaded for shipment. As a general rule, meal which has been cured on the floor also is stowed loosely for 24 to 48 hours after grinding. By using these precautions the heat of oxida-

tion is dissipated quite rapidly and the danger of excessive heating is minimized, although the temperature of the meal in the center of the bag may increase some 50 to 100° F. during the first 6 to 12 hours. Meals lower in oil or prepared from fish yielding oils of lower iodine number do not tend to heat so severely and can be handled with somewhat greater dispatch.

In giving critical consideration to the precautionary measures taken in the handling of fish meal, it is seen that they are palliative rather than corrective. The operator does not prevent oxidation; instead, he causes it to proceed under his control. The procedure partially solves the practical problem of heating and resultant fire hazard but it still subjects the meal to pronounced chemical change. The consumer receives a highly oxidized product at the best and it is doubtful if anyone knows the potential food value of a fresh unaltered fish meal. Therefore, since existing practice causes inconvenience, increased handling costs, and greater storage requirements while still permitting changes in the product detracting from its potential utility, a more satisfactory solution to this problem should be sought.

From a purely theoretical standpoint the ideal procedure would be to remove the troublesome oil by solvent extraction. The method, however, is subject to about the same type of handicap as dry rendering. A more likely field of approach, as far as possibility of acceptance is concerned, would appear to be in methods designed to prevent oxidation. Two such methods may be suggested; namely, pelleting and the use of air-proof containers, either of which might be facilitated by incorporating harmless antioxidant materials in the meal.

The idea of compressing freshly prepared fish meal into pellets was first conceived several years ago in connection with the problem of handling meal aboard floating factory ships. A commercial installation was made and the initial results were reported as satisfactory. However, the vessel discontinued operations shortly thereafter and no additional commercial work has been reported. The possible application of pelleting as a method of retarding oxidation in fish meal should be studied further.

Food products industries have made considerable progress in retarding oxidation in fatty foods by the adoption of various types of air-proof containers. A similar procedure would appear to have possible merit in the handling of fish meal provided it did not contribute to some detrimental effect of another type. During the past year the Bureau of Fisheries has carried on experiments of this nature which demonstrate quite conclusively that the danger of heating can be practically if not entirely eliminated by packing the meal in multi-wall kraft and asphalt paper bags. Observations which have been made over a period of eight months have failed to show any detrimental effect from this type of package although oxidation apparently takes place to a limited extent. Further aspects of the problems must still be investigated.

When the oil in fish meal becomes oxidized, it becomes less soluble in normal fat solvents; thus, during the period of heating previously discussed, the oil content of the meal indicated by "ether extract" value will appear to decrease. A similar situation pertains during subsequent storage and within a period of several months the apparent oil content in some cases may be as much as 50 percent under its initial value. This condition, together with the fact that uniform methods for determining fat are not followed in testing laboratories, has given rise to a confusing situation in sale and distribution because many buyers specify a definite limitation in the amount of oil which can be present in the meal purchased.

When other than fresh raw materials are used in the manufacture of fish meal, various end products of both protein and fat decomposition may be expected in the finished product. When crude methods of manufacture necessitate delays between the various steps in the process, further deterioration will normally take place. If meal is dried at excessive temperatures or moisture is not removed with sufficient rapidity, as may occur in attempted natural air-drying in inclement weather, nutritional properties may be impaired and other breakdown of the material may occur. Similarly, improper handling methods after manufacture may lead to detrimental chemical and biological changes other than those previously mentioned with regard to oxidation. With the possible exception of the natural tendency toward oxidation, the other forms of change which impair quality can be controlled if a reasonable amount of care is taken. Unfortunately, this is not always the case.

If fish meal is to attain full recognition for the inherent chemical and biological qualifications which give it advantage over other protein concentrates, means should be

provided the buyer for differentiating between desirable and undesirable materials prior to sale. When this is attained there will be a greater premium for the product having the most desirable properties and the manufacturer will have greater incentive for preparing a higher quality product. Development of more reliable methods for evaluating the properties and composition of fish meal will be a definite aid in this direction and offers a field of study which is deserving of greater attention.

The several aspects of fish meal manufacture and distribution which have been discussed and the problems arising therefrom are closely associated with the future progress of fish reduction industries. The elimination of waste during manufacture is not only economically sound but is, in fact, a type of conservation, since less drain would be required on a fishery to produce the same quantity of finished product. Prevention of oxidation in fish meal during manufacture and storage has the possibility of reducing production costs and giving the customer a more desirable product having greater utility in animal feeding. Improved methods for evaluating the composition and properties of fish meal offer promise of promoting more intelligent purchasing and distribution, and a general improvement in the quality of fish meal.

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THE SHARK FISHERY OF THE SOUTH ATLANTIC COAST

By Donald Y. Aska
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U. S. Bureau of Fisheries

For years man has endeavored to devise and discover new fields of activity for his fishing efforts. One interesting ramification of this has been the introduction of the shark fishery to the South Atlantic Coast. Although dwarfed in the volume of its commercial yield by many other fisheries of this area, the fishery for sharks remains as one of the most spectacular because of the imposing appearance and vicious temperament of this aquatic form. The fishery today is prosecuted in the waters of the Atlantic Ocean from Cape Lookout, N. C., to and around the tip of the Florida Keys, the principal landing and processing ports being at Morehead City in North Carolina, and Mayport, Salerno, Cortez, and Key West in Florida.

The seeking of sharks for industrial and food purposes dates back to ancient times. The natives of India, Japan, China, and other countries of the Far East have fished for the giant basking shark since time immemorial. A paper dated 1850, which was written by Doctor Buist of the Zoological Society of London, mentioned the fact that the native fishermen of Kurrachee, India, harpooned the basking shark and further stated that "this shark is often 40, sometimes 60, feet in length. * * * The liver is taken out and boiled down for oil. * * * The flesh is cut off in long strips and salted for food. The Banians collect them in quantities * * * they are sold for shipment to China." In 1844 a flourishing fishery for the Greenland shark was established in the North Atlantic, the hides being shipped to Norway and Denmark, where they have long been used for shoes and other leather commodities.

There are 10 species of sharks contributing to the commercial catch along the South Atlantic Coast. These are the leopard, dusky, brown, sand, sandbar, blacktip, mackerel, hammerhead, sawfish, and nurse shark. The leather from the sawfish shark and the nurse shark are graded separately; however, because of the similarity of the leathers obtained from the other species, they are all classified as "Eastern" sharks.

While all of these species are captured along the South Atlantic Coast, only those referred to as Eastern sharks are taken in any considerable quantity. The sand shark and the leopard shark fisheries probably rank foremost in commercial importance with respect to both the quantity and value of the catch.

The fishery reaches its maximum intensity in the winter and spring months, for it is then that the shark liver has the highest oil content; however, fishing continues in most localities throughout the entire year.

Sharks can be captured with many types of bottom gear, but the most effective are anchor gill nets and set, or trawl, lines. Set lines are similar in design and operation to the trawl lines used by the cod fisherman of the North Atlantic, the main difference being in the relative strength of the two. Shark lines are usually about two hundred yards long and constructed of heavy test Manila rope or steel chains. The latter are far more satisfactory but due to their extremely high cost their use is generally restricted. Along each line at intervals of from six to eight feet are attached snoods of cable about six feet in length, each bearing a hook, usually of about size No. 13. Since most of these hooks are imported from Norway, they are rather expensive, averaging about 28 cents each. They are baited with fresh fish of which mullet and bluefish are preferable; however, due to the demand for these fish as items of human consumption, their price is usually too high for practical use. Thus, the selection of suitable substitutes is apparently one of the most formidable problems encountered by the shark fishermen, for, contrary to general belief, the shark is quite particular concerning its food. Most set-line fishermen contend that their main problem is not in capturing sharks but in finding a sufficiently economical bait which is yet attractive to the shark.

The lines when baited are set out on "the banks" along the coast at locations where the water depth varies from about 3 to 20 fathoms. A stock anchor of 50 pounds weight is set at each end with a buoy line extending from each anchor to a floating drum at the surface. The latter acts as a buoy for the line as well as a marker to guide the fishermen in locating their lines when ready to retrieve them.

The lines are fished much the same as the cod trawl line and are hauled in either manually or, as is the present trend, by the use of power. The buoy is first taken in; then the anchor is hauled up and set out over the stern. Following this, the entire line is brought over the bow of the boat on a roller or "sheave".

When a hooked shark is brought to the surface it is usually struck a sharp blow on the nose with an iron bar. If this fails to subdue it, it is killed by a gun shot. The fish is then removed from the hook and swung on the deck by means of a block rigged from the mast of of the boat. Fresh bait is substituted for the old in each instance before returning the snoods to the water. A good day's yield for a crew fishing several of these lines is from 12 to 20 sharks.

Many discouraging features enter into the fishery. In Southern waters, with such a profusion of marine predators, a hooked shark is often attacked by its own kind, or perhaps a roaming barracuda will in one tearing sweep reduce the defenseless victim to a sacrificial meal for all of the marauding aquatic forms. Thus many sharks are hooked but when brought into the boat few are free from battle scars which may render their hides valueless.

The typical anchor gill net employed in the shark fishery is about two hundred yards in length and constructed of No. 72 cotton twine. The mesh commonly used is 20-inch stretch measure so that when the usual net of 15 meshes deep is hung it has a depth of about 17 feet.

The cork lines consist of No. 18 tarred Manila line with 4-inch corks set at intervals of about three feet. A lead line of No. 15 Manila rope, hung with No. 8 bullet leads at 2-inch intervals, is used. The net when fished is anchored at each end and has a buoy line extending from each anchor to a marker buoy similar to that employed in set-line fishing. The net lifting operation is like that of any common gill net.

The general practice is for a crew to fish five nets at one time. Two nets are usually on the beach at all times being dried and mended. They are not allowed to remain in the water for a period of more than four or five days, as they tend to become water-logged if continuously submerged for a longer time. Very seldom is a net lifted without large holes appearing in it, since sharks when captured thrash around in the net and tear it with their razor-like fins. Thus, the nets must be rotated frequently and consequently it is almost a necessity for a crew to possess at least seven nets, five being fished while two remain on the shore for drying and mending. Under optimum conditions the life expectancy of a net may be as much as two years, but fishermen consider themselves fortunate if one lasts a full season. The cost of a net of this type will range from $30 to $40 dollars, depending on whether it is hand tied or machine strung, the former being the more desirable.

It is interesting to note that the fishermen of Florida find the set line the most productive type of gear while the fishermen of North Carolina maintain that the anchor gill net is the most satisfactory. Perhaps the preference for the gill net in the latter State is due to the fact that hard crabs, which are abundant in these more northern waters, frequently destroy the bait from lines set for sharks and thus render them ineffective. Trawl lines with snoods buoyed to suspend the baits above the bottom are being seriously considered for use in North Carolina, although their effectiveness is yet to be determined.

Not only is the capture of these aquatic animals arduous, and at times dangerous, but considerable skill and care is required for their later handling and processing--the skinning, dressing, rendering of the oil, and salting of the hides--for it is in these functions that profits are made or losses incurred. A shark mishandled by an inexperienced or incompetent skinner or "flesher" can soon be reduced to a valueless carcass. However, with proper care, valuable products may be recovered.

Upon landing, the sharks are piled on the dock and are thoroughly washed with sea water. Skinning follows quickly thereafter. The fins are removed by simple sweeps of the knife, the tail or caudal fin being removed at the root or base knob. As the tail of the shark has no commercial value, it is not included in the measure of the hide when computing its value. The hide is then split along the back through the holes left by the removal of the fins. Contrary to the method of skinning most animals, the incision is made along the back and the belly is left untouched. The nose is cut off a short distance from the tip, thus making the length of measure as from the nose cut to the caudal cut. The skinner or "flayer" does not attempt to thoroughly remove the meat in the skinning process as this will be done by the flesher when he cleans the hide. During all operations the hide is kept well soaked with sea water to prevent hardening or drying.

Fleshing is probably the most crucial step in the entire preparation of the hide, for it is here that a false move of the sharp fleshing or "beaming" knife would completely ruin the hide. As each knife wound diminishes the market value of the hide, a skillful flesher is a valuable employee. In the fleshing process the hide is draped over a curved board of about six feet in length with the flesh side uppermost. The fleshing knife in appearance is similar to a carpenter's draw-knife but in operation is pushed away from, rather than drawn toward, the operator. A skillful flesher can in five minutes completely remove all the meat adhering to the hide as well as trim it to its finished form.

After fleshing, the hides are thoroughly washed in sea water and made ready for curing. As they are stacked, flesh side up, a moderate quantity of salt is placed on each one. For this purpose mineral salt is preferable to sea-water salt. After a period of from four to five days the hides are considered sufficiently well cured for shipment to the market. Under no circumstances are they permitted to remain in the salt for a period longer than six days as mold or "sour" spots will appear. Shipment is usually made in open barrels covered with a damp burlap sack to keep out sunlight.

Shark skins upon arriving at the tannery are graded into various classifications, depending upon size, quality, color, cure, weight, and freedom from battle scars, skinning scars, or sour spots. They are sorted into first, second, third, and fourth grades, the latter being considered of no value.

The natural hide has a rough cover of denticle growths or "shagreen" which must be removed before tanning. Prior to 1931 processes were discovered and patented for the removal of shagreen, thus facilitating the tanning of the hides into a soft, pliable, and durable leather product.

Shoes, luggage, belts, braces, watch fobs, brief cases, and many other articles are among the useful commodities manufactured from the shark hides. Former uses of the skins, before methods had been found for removal of the shagreen, were as abrasives and for sword hilts, the latter being used by Japanese warriors for centuries.

The fins of all species of sharks, with the exception of the nurse shark, are of value as edible commodities. Those of the nurse shark contain no gelatin stock and are therefore nonedible. When removed, the fins are washed in sea water, soaked in a moderate brine solution for a few hours, and then carefully sun dried for from 12 to 15 days. After drying, they are shipped to the centers of Oriental populations where they are considered items of

great delicacy, for, when soaked in hot fresh water, the gelatinous fin structure of the dried fins produces a delicious soup.

The liver contains practically all of the oils to be found in the body of the shark. It usually comprises about one-quarter of the live weight of the shark, although this ratio varies according to species and the seasons of the year. The liver is rendered shortly after removal from the body cavity for if it should be allowed to remain for any considerable time without processing it quickly decomposes, developing a strong, pungent odor which continues in the liver oil after extraction. A gasoline drum or similar container can be used for a boiler for rendering purposes. After covering the bottom of the drum with fresh water to prevent the oil from burning, the finely chopped liver is added. A slow fire is desirable as the oil should at no time boil actively. After two hours of heating, the oil should be completely extracted from the liver. The fire is then withdrawn and the rendered oil allowed to cool slowly, producing a clear brown liquid. Careful straining through a thick filter removes any remaining foreign particles and the resultant oil is now ready for shipment to the market. The liver residue can be used for making gelatin for edible or photographic purposes.

Very few test analyses have been published which accurately reveal the vitamin content of shark liver oil. Those few tests which have been published do, however, indicate that the vitamin content varies considerably in the different species of sharks. Workers in this field acknowledge that the oil has a rather high vitamin A potency although possessing a deficiency of vitamin D. For this reason the main utilization of high grade shark liver oil has been as a fortifier to other fish liver oils rich in vitamin D. The lower grade oil is utilized in the manufacture of paint and varnish thinner, tanning oils, and low grade soaps.

After the fins, hide, and liver have been removed, the remaining carcass is generally discarded, but it may be used for the production of meal and scrap. As this meat is unusually high in protein and minerals, it is desirable for livestock and poultry feed. When mixed with other standard feeds, it acts as a fattening agent and tests have proved its fat inducing properties. One of the obstacles encountered in the manufacture of shark meal and scrap is that crews may move from one location to another during the various seasons; consequently, the accumulation of raw material in any one place is difficult. However, in Florida there is one mobile plant in operation which produces a small output of meal. The lack of more extensive operation of such mobile plants has no doubt been due to prohibitive production costs.

Even the teeth of the shark may be marketed. From 100 to 150 saleable teeth can be obtained from an average sized leopard shark. They are usually sold as novelties or used for advertising purposes by novelty shops as well as by the manufacturers of shark-skin shoes. The jaws are occasionally removed from the carcass and after careful cleansing sold as novelties.

In more recent years a shark fishery has been introduced in California and in the Puget Sound district of Washington. However, the greater development of shark fishing in all areas probably has been retarded principally because of undeveloped markets for the products of the shark, rather than from a shortage in the supply of these fish in the sea.

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FEDERAL HATCHERY OUTPUT OF FISH AND EGGS EXCEEDS SEVEN AND ONE-HALF BILLIONS

The Division of Fish Culture has released its final figures covering the production and distribution of fish and eggs from the 102 Federal hatcheries that were on a productive basis during the year ending June 30, 1939. The grand total of 7,585,152,885 is approximately one-half billion below that for the fiscal year of 1938 when 8,121,131,985 were produced. During 1938 and previous years, the Fairport, Iowa, station obtained from commercial fishermen along the Mississippi River carp and buffalofish eggs, which, after fertilization, were planted on the natural spawning grounds of these species. In 1939 this unit handled only 78,681,500 buffalofish eggs and no carp eggs, whereas in 1938, 387,445,000 buffalofish

eggs and 329,200,000 carp eggs were collected. The combined output of all other species of fish handled was more than that of last year. There were increases in the output of eggs and fry of cod and haddock, while there was a slight recession in production of flatfish and pollock. Shad, pike perch, and lake trout were handled in great numbers but there was a reduction in the number of whitefish propagated. The production of largemouth black bass, which is undoubtedly the most popular species of pondfish with the sportsmen throughout the United States, was more than 50 percent in excess of that for the previous year. Smallmouth black bass, warmouth bass, and rock bass were also handled in greater numbers. Ten thousand Kentucky bass were produced at the Norris, Tenn., and Cohutta, Ga., stations. This is the first time in the history of the Bureau that this species of fish was handled. The reduction in the number of catfish and sunfish distributed is ascribed to the fact that rescue and salvage operations on the Upper Mississippi River, where large quantities of this species are obtained, were greatly reduced due to the development of a waterway in that area. While the production of rainbow, brook, Loch Leven, and blackspotted trout was below that of 1938, the fish handled were reared to a larger size before liberation. In order to give a clear conception of the production of each variety handled, there follows a summary, by species, of the output:

Summary, by Species, of the Output of Fish and Fish Eggs during the Fiscal Year ending June 30, 1939

Species	Eggs	Fry	Fingerlings	Total
Catfish	--	10,000	417,865	427,865
Buffalofish	78,681,500	--	800	78,682,300
Shad	--	39,323,220	--	39,323,220
Whitefish	32,960,000	920,000	--	33,880,000
Lake herring	--	3,000,000	--	3,000,000
Striped bass	--	1,797,950	--	1,797,950
Chinook salmon	5,607,200	21,812,610	26,469,400	53,889,210
Chum salmon	1,369,000	7,594,900	375,250	9,339,150
Silver salmon	--	--	716,675	716,675
Sockeye salmon	75,000	--	2,343,505	2,418,505
Sockeye salmon, landlocked	122,960	--	444,155	567,115
Steelhead trout	35,000	--	935,255	970,255
Landlocked salmon	--	--	5,990	5,990
Rainbow trout	4,329,850	238,140	10,402,915	14,970,905
Blackspotted trout	26,362,290	2,328,440	11,436,040	40,126,770
Loch Leven trout	77,490	--	1,421,035	1,498,525
Lake trout	276,280	1,636,750	103,670	2,016,700
Brook trout	5,000	1,410,500	10,308,065	11,723,565
Golden trout	6,100	--	71,040	77,140
Grayling	1,799,800	4,496,750	258,050	6,554,600
Pike and pickerel	1,643,150	--	--	1,643,150
Crappie	--	--	430,745	430,745
Black bass, largemouth	--	3,787,650	8,668,965	12,456,615
Black bass, smallmouth	--	1,400,500	325,360	1,725,860
Kentucky bass	--	7,000	3,350	10,350
Rock bass	--	--	121,960	121,960
Warmouth bass	--	--	91,415	91,415
Sunfish	--	--	8,788,400	8,788,400
Rio Grande perch	--	--	175,760	175,760
Pike perch	4,271,950	330,490,000	--	334,761,950
White perch	--	4,300,000	260	4,300,260
Yellow perch	--	300,666,000	17,030	300,683,030
Mackerel	--	11,060,000	--	11,060,000
Cod	2,608,475,900	132,605,200	--	2,741,081,100
Haddock	1,172,796,700	5,768,300	--	1,178,565,000
Flatfish (flounder)	--	1,185,940,100	--	1,185,940,100
Pollock	1,446,519,100	50,762,700	--	1,497,281,800
Lobster	--	4,048,950	--	4,048,950
Totals	5,385,414,270	2,115,405,660	84,332,955	7,585,152,885

WHOLESALE FOOD PRICES HIGHER

Wholesale commodity prices continued on the upward trend during the last week of December. According to the Bureau of Labor Statistics, an increase of 0.1 percent brought the all-commodity index to 79.4 percent of the 1926 average, or almost to the level of the 1939 high of late September. Sharp advances in prices of livestock and silk largely accounted for this increase.

The level of average retail prices of staple foods remained unchanged from December 27 to January 3 in 13 cities covered. The index of retail prices of staple foods on January 3 was 2.9 percent above the level of August 15 when food prices took a strong upward trend. While prices of most staple foods did not change over the New Year, flour and pork chops tended to rise in price and butter and lard dropped in price. On November 14 a 16-oz. can of pink salmon in 51 cities sold at an average price of 14.7 cents, an increase of 3.5 percent over the average price on October 17. Red salmon sold for 25.1 cents per can, an increase of 1.2 percent.

NEW ENGLAND VESSEL LANDINGS SHOW INCREASE

Landings of fishery products at the ports of Boston and Gloucester, Mass., and Portland, Maine, by fishing craft of 5 net tons capacity and over, during November, totaled 32,678,000 pounds, valued at $887,000 to the fishermen, according to data compiled by the Bureau of Fisheries. This is an increase of 4 percent in quantity and 31 percent in value as compared with the same month in 1938. Of the total landings during November, 72 percent was delivered to Boston, 24 percent to Gloucester, and 4 percent to Portland.

Prices paid fishermen during November for all principal species except mackerel and yellowtail flounders showed a marked increase as compared with the same month in 1938.

The principal items landed during November were cod, 9,556,000 pounds, valued at $263,000; pollock, 8,136,000 pounds, valued at $146,000; rosefish, 5,067,000 pounds, valued at $85,000; and haddock, 6,012,000 pounds, valued at $257,000. The landings of these items alone accounted for 88 percent of the total landings at the three ports during November.

Landings at the three ports during the first 11 months of 1939 amounted to 357,635,000 pounds, valued at $8,738,000--a decrease of 4 percent in the volume of the landings but an increase of 6 percent in value as compared with the same period in 1938. Four species accounted for 83 percent of the total quantity landed during the first 11 months of 1939. These were haddock, 126,543,000 pounds, valued at $3,400,000; cod, 74,959,000 pounds, valued at $1,835,000; rosefish, 71,333,000 pounds, valued at $987,000; and pollock, 22,861,000 pounds, valued at $414,000.

BOSTON FISH SALES AVERAGE 3.17 CENTS PER POUND

The 21,154,000 pounds of fish landed at the Boston Fish Pier and sold over the New England Fish Exchange during November brought an average of 3.17 cents per pound, according to information compiled by the Boston Fishery Market News office. The catch, which was the result of 538 trips to inshore and offshore banks, was worth over $670,000 to the fishermen.

Increased landings of cod and pollock, together with a decrease in the value of these varieties, resulted in a decline of 0.17 cents per pound, or 5 percent, in the average price for all fish during November as compared with October when total landings were one-quarter million pounds larger. However, the average price remained 0.77 cents per pound, or 32 percent, higher than in November a year ago.

Offshore vessels accounted for 18,042,000 pounds of the catch and inshore craft for 3,112,000 pounds. The average price for species taken offshore was 3.22 cents per pound, 7 percent under October and 3 percent above November last year.

Heavy landings of market cod taken by offshore vessels averaged 2.69 cents per pound for 5,139,000 pounds as compared with 3.42 cents for 1,950,000 pounds in October and 2.07

cents for 4,340,000 pounds a year ago. Landings of large cod totaling 1,880,000 pounds sold for 3.17 cents per pound as compared with 1,361,000 pounds at 4.64 cents in October and 2,024,000 pounds at 2.50 cents in 1938.

Haddock landings were only 3,205,000 pounds, one-third less than in October and about 200,000 pounds under November last year. The price, however, was high, averaging 5.11 cents per pound as compared with 3.98 cents in October and 4.20 cents a year ago. Scrod haddock landings of 2,147,000 pounds were approximately one-half those of the preceding month and three-quarter million pounds under the corresponding month in 1938. Like haddock, the price was up, the catch bringing an average of 3.18 cents as compared with 2.79 cents in October and 1.86 cents last year. Presaging the advent of the pollock season, the November landings of this variety by offshore vessels amounted to 2,093,000 pounds, nearly triple the quantity taken the previous month and about one-half million pounds under the catch in the same month last year. As might be expected, the price dropped to 1.93 cents from 2.55 cents in October, but was well above the 1.20 cents average price paid last year.

Landings by offshore vessels for 11 months this year are running about 11 percent below landings for the corresponding period in 1938. All important species have been taken in lesser quantities with one exception--scrod haddock landings are 17 percent greater.

LAKE TROUT, HALIBUT AND SHRIMP IMPORTANT IN CHICAGO MARKET

Receipts of fresh and frozen fishery products at the Chicago Wholesale Fish Market during November consisted of 79 classifications of seafood totaling 5,248,000 pounds, only 7 percent less than in October but 52 percent more than during November 1938, according to the Chicago Fishery Market News office. Of this total, 2,757,000 pounds or 52 percent was fresh-water fish, a decrease of 1 percent since last month and an increase of 31 percent since last year; 1,189,000 pounds or 23 percent consisted of salt-water fish, which was 27 percent less than in October but 64 percent over last November; and 1,302,000 pounds or 25 percent was shellfish, a gain of 4 percent since the preceding month and 106 percent over last year. Of all the varieties of seafood, lake trout, halibut, and shrimp arrived in the largest quantities, amounting to 965,000 pounds, 660,000 pounds, and 842,000 pounds, respectively. Michigan and Wisconsin furnished the bulk of the lake trout. About 95 percent of the halibut was frozen and two-thirds represented the catch of United States vessels shipped in bond from British Columbia. Nearly all of the shrimp arrived from Louisiana and Texas, 11 percent being frozen. Receipts of lake trout were 58 percent above last month and 52 percent above November 1938. Halibut receipts decreased 26 percent as compared with October, but were nearly double those of November last year. The shrimp receipts were about the same as last month, an increase of 87 percent over a year ago.

Of the total receipts of all seafood entering the Chicago market in November, 38 percent was transported by rail freight; motor-trucks brought in 32 percent; and the remaining 30 percent arrived by express.

SEATTLE SABLEFISH RECEIPTS SHOW LARGE INCREASE

During November 1939, vessels of the Seattle local halibut fleet found steady employment in supplying the increased market demand for sablefish, due in part to the failure of the Puget Sound chum or fall salmon run to materialize. The November sablefish landings of 872,000 pounds, made in 67 trips, were more than double the 1938 landings of 340,000 pounds, made in 28 trips. Indications of a firm market for this species were noted in the average price of 6.3 cents per pound paid for sablefish sold over the Seattle Fish Exchange during November 1939, as compared with an average of 4.2 cents per pound for the same period a year ago. It is understood that most of the receipts were frozen in order to supply a suitable substitute for the large shortage of chum or fall salmon. The 1939 Seattle receipts of chum salmon were over 3,750,000 pounds short of the 1938 receipts for 11 months ending with November.

Since the local fleet landings of sablefish could not begin to make up this shortage, there has been a considerable movement of frozen sablefish from Alaska to be used locally

for cold-storage stocks. During November and the first half of December 1939, 572,628 pounds of frozen sablefish were received in Seattle from Alaska, as compared with 77,905 pounds received during the same period a year ago.

PUGET SOUND SALMON SEASON CLOSED NOVEMBER 20

The Puget Sound salmon season was closed by State law on November 20 except for Indians fishing on their reservations. The total 1939 pack amounted to 381,000 standard cases as compared with 155,000 cases and 445,000 cases packed during the 1938 and 1937 seasons, respectively, according to preliminary season totals released by the Washington State Department of Fisheries. Of the 1939 pack, more than 70 percent, or 270,000 cases, was humpback or pink salmon.

GERMAN CREDIT ASSISTS RUMANIAN FISHING INDUSTRY

Credit has been granted by Germany which will enable Rumania to enlarge and modernize its deep-sea fishing fleet, according to information published in "Foodstuffs Round the World" on January 5. This is to be accomplished through the purchase of German fishing boats, motor barks, and refrigerator cars, as well as machines and equipment for the construction and outfitting of a new fish receiving station. The credit is reported to have been negotiated at Bucharest.

CODFISH CATCH IN PORTUGAL INCREASES

The 1939 catch of codfish by the Portuguese fleet, taken on the Grand Banks, is estimated at about 40,000,000 pounds, according to information furnished by the American Consulate General at Lisbon and published in "Foodstuffs Round the World" by the Bureau of Foreign and Domestic Commerce. The catch in 1938 amounted to about 36,000,000 pounds and that in 1937, 35,000,000 pounds. With financial and other assistance from the government, the codfish catch of Portugal is now double that of 1934 and five times that of 1930.

SARDINES ABUNDANT ON NORTH COAST OF PORTUGAL

Fishing vessels have been landing large fares of sardines at Mattozinhos (Leixoes), Lordelo Do Ouro, and Afurada on the northern coast of Portugal, according to information submitted by the American Consulate General at Lisbon and published by the Bureau of Foreign and Domestic Commerce. These increased landings are most encouraging to fishermen and canners in view of the scarcity of sardines in recent years and the reports that orders for the belligerent countries are keeping prices high.

CANNED SEAFOOD SALES MONOPOLY DEVELOPED BY JAPANESE MERGER

A new concern known as the Suisan Kanzume Hambai K. K. (Canned Marine Products Sales Company) was formally established in Japan on September 28, according to information furnished by the American Commercial Attache in Tokyo and published in "Foodstuffs Round the World". The new firm which is said to have an authorized capital of 5,000,000 yen is understood to have resulted from a merger of the Canned Sardine Joint Sales Company, the Canned Shellfish Joint Sales Company, the Canned Tunafish Sales Company, and several other minor concerns. It will take charge of all sales to exporters of canned marine products except salmon and crabs, exercising control over prices and distribution. It is reported that a goal has been set for the production of 4,000,000 cases of marine products other than salmon and crabs for this year, and that 3,000,000 cases are expected to be sold to the military and to foreign currency countries. The new concern also will undertake the purchase and distribution of tin cans and other necessary raw material to insure a steady supply.

PROFITABLE WHALE CATCH EXPECTED BY JAPAN

European nations are "rushing" inquiries concerning the purchase of whale oil to Japanese firms, according to information included in "Foodstuffs Round the World" published on December 15 by the Bureau of Foreign and Domestic Commerce. Japanese whaling interests are encouraged not only on account of the decreased competition in the Antarctic this season, but also because of the anticipated high price for whale oil. The only obstacle, it is reported, to Japanese dominance of Antarctic whaling are the Norwegian whalers, since the British, who occupied first place in Antarctic whaling, and the Germans, who occupied fourth place, will probably not engage in the fishery this season. It is said that whale oil is being quoted in Europe at from $155 to $175 per ton, which is more than three times the price prevailing last spring. England, however, was reported to have fixed its official buying price at about $78 per ton.

WHALE OIL PRODUCTION OF FAROE ISLANDS UP

The production of whale oil during 1939 in the Faroe Islands is estimated at 1,100 tons, according to information supplied by the American Commercial Attache at Copenhagen and published in "Foodstuffs Round the World". The 1939 production was about 50 percent greater than that of the preceding year and approximately the same as the output in 1937. The 1939 catch was reported to have consisted of blue, fin, and caing whales, and included 149 large whales and many smaller ones. Whale oil produced in the Faroe Islands is shipped to Denmark for refining. Denmark's total refined production of whale oil, fat, and tallow from all sources during 1938 was said to have aggregated 43,000 tons. It was further reported that the Danish Government in August 1939 issued an export embargo on whale oil in order to retain this oil for margarine production, for mixing with other types of lubricating oil, and possibly for its use in the soap-making industry.

FROZEN FISH TRADE

Domestic Holdings of Frozen Fish Up

The holdings of frozen fishery products in cold-storage warehouses throughout the United States and Alaska on December 15 aggregated 92,718,000 pounds as compared with 90,711,000 pounds on the same date a year ago, according to data included in Bureau of Fisheries Statistical Bulletin No. 1307. Items of importance with respect to volume in storage on December 15 included whiting, 8,853,000 pounds; halibut, 7,507,000 pounds; salmon, 7,468,000 pounds; mackerel, 6,457,000 pounds; haddock fillets, 6,390,000 pounds; pollock fillets, 4,808,000 pounds; and shrimp, 4,784,000 pounds.

Comparisons of some of the more important items on December 15 with a year ago show increased holdings of lake herring, cod fillets, croakers, haddock fillets, lake trout, mackerel, pollock fillets, and rosefish fillets. There were decreases in the holdings of halibut, sea herring, salmon, scallops, and shrimp.

During the month ended December 15, 1939, cold-storage warehouses in the United States and Alaska froze 21,549,000 pounds of fish. This is an increase of 37 percent over the same period last year. This increased freezing activity was reflected in both fish and shellfish, the former increasing 42 percent and shellfish 12 percent. The more important items frozen during the month were pollock fillets, 4,274,000 pounds; shrimp, 2,204,000 pounds; cisco (lake herring), 1,771,000 pounds; rosefish fillets, 1,389,000 pounds; cod fillets, 1,296,000 pounds; and whiting, 1,178,000 pounds. All of these were frozen in greater quantities in the month ended December 15, 1939, than in the same month of the preceding year.

Domestic holdings of cured fish in cold-storage warehouses on December 15 amounted to 16,078,000 pounds as compared with 11,790,000 pounds on the same date in 1938--an increase of 36 percent. Holdings of mild-cured salmon increased from 6,560,000 pounds on December 15, 1938, to 7,517,000 pounds a year later--an increase of 14 percent.

Frozen Pollock Stocks Increase Rapidly

Stocks of frozen pollock fillets in Boston cold-storage warehouses soared upward during the 4-week period ending December 27, according to the Boston Fishery Market News Service. On November 29 the total holdings for this classification amounted to but 1,495,000 pounds while four weeks later they had risen to 3,116,000 pounds, a gain of 1,621,000 pounds or 108 percent. However, notwithstanding the heavy increase, stocks of this classification were 11 percent less than those of a year ago.

Collectively, the total Boston frozen fish holdings increased 8 percent during the four weeks, total holdings on the last Wednesday in December amounting to 14,804,000 pounds, 12 percent lower than last year's total. In addition to pollock, other frozen items stored in quantities in excess of a million pounds were haddock fillets, 2,959,000 pounds; mackerel (all sizes), 2,433,000 pounds; cod fillets, 1,633,000 pounds; and whiting, 1,153,000 pounds.

New York Frozen Fish Holdings Approximate Ten Million Pounds

Stocks of frozen fishery commodities in New York City cold-storage warehouses totaled 9,762,000 pounds on December 28, representing increases of 3 percent and 6 percent over the preceding four weeks and a year ago, respectively. A year ago the frozen holdings amounted to 9,242,000 pounds. Classifications which showed appreciable gains during the month were bluefish, spiny lobster tails, and Japanese swordfish. Considerable decreases were shown in the squid, sablefish, pulpi, mackerel, halibut, and unclassified salmon holdings. Forty-one classifications of salt-water fish constituted 51 percent of the total holdings, 13 fresh-water classifications totaled 28 percent, and 9 classifications of shellfish and miscellaneous fishery products made up 21 percent of the total. In volume, frozen sturgeon was the most important classification stored, supplanting shrimp which led last year in this respect. On the last Thursday in December 928,000 pounds of sturgeon and 809,000 pounds of shrimp were stored, representing decreases of 7 and 43 percent, respectively, from a year ago.

Chicago Frozen Fish Stocks Increase 8 Percent

Chicago frozen fish stocks increased 8 percent from November 30 to December 28, according to the Chicago Fishery Market News Service. The gain was due primarily to increased storing by dealers of shrimp, lake herring and chubs, and halibut. The first classification increased 394,000 pounds during the 4-week period, to 865,000 pounds. However, compared with shrimp holdings on the corresponding date last year, the current figure was 29 percent less. Lake herring and chub holdings increased 164,000 pounds during the month, a gain of 33 percent. Increasing 19 percent during the month, halibut holdings reached a total of 326,000 pounds but were 11 percent below last year. Lake trout, of which stocks amounted to 975,000 pounds, reflecting a gain of 2 percent over last month and 56 percent over last year, was the principal fish, in volume, stored. Stocks of blue pike and sauger combined increased 201 percent over the preceding year, total holdings for this classification on December 28, 1939, being 683,000 pounds.

Canadian Holdings of Frozen Fish Decrease

Canadian storage stocks of frozen fresh fish on January 1, 1940, amounted to 28,707,000 pounds, according to preliminary data released by the Dominion Bureau of Statistics. This is a decrease of 11 percent as compared with the holdings a month previous and a decrease of 9 percent as compared with the holdings on the same date in 1939. The principal items in storage on January 1, this year, were sea herring, 5,683,000 pounds; salmon, 5,199,000 pounds; mackerel, 3,012,000 pounds; halibut, 2,471,000 pounds; cod fillets, 2,024,000 pounds; whitefish, 1,995,000 pounds; and tullibee, 1,231,000 pounds. Of these more important items, sea herring, mackerel, and tullibee showed increased holdings over January 1, 1939, while decreases were recorded for the others. In addition to the holdings of frozen fresh fish, it

was reported that stocks of frozen smoked fish on January 1 amounted to 2,545,000 pounds, representing a decrease of 25 percent from the same date in 1939. Stocks of dried, pickled, and salted fish amounted to 6,225,000 pounds, increasing 71 percent over last year. The more important classifications of frozen smoked fish in storage this year were cod fillets, sea herring kippers, and finnan haddie, while the outstanding items of dried, pickled, and salted fish were dried whole cod, greensalted whole cod, and salmon.

CANNED FISH TRADE

Unsold Canned Salmon Stocks Below Those of Year Ago

On December 31 unsold stocks of canned salmon in the hands of packers totaled 2,141,000 cases of 48 one-pound cans, according to the Association of Pacific Fisheries. This was a decrease of 5 percent under the holdings of 2,256,000 cases at the end of November and 23 percent less than the unsold stocks of 2,769,000 cases held on December 31, 1938. Of the total unsold stocks held on December 31 of this year, 64 percent was Alaska red salmon; 21 percent pink; 7 percent chum; 4 percent cohoes, silvers, and medium reds; the remaining 4 percent being made up of chinook, Puget Sound sockeye, bluebacks, and steelheads. A year ago the most important varieties in the unsold stocks were Alaska red salmon and pink salmon, which constituted 46 percent and 37 percent, respectively, of the total.

Seattle Canned Salmon Prices Up

Average wholesale prices as quoted by Seattle salmon brokers for canned salmon show a sharp increase in most species over a year ago, chum and pink salmon prices being particularly stronger than last year. The following table makes a comparison of prices paid for certain stocks on December 15 of this year and the comparable date a year ago:

Species	December 15, 1939 Per dozen	December 15, 1938 Per dozen
Chinook or king, 1 lb. fancy flat..	$3.70	$3.60-3.70
Chum, 1 lb. tall.....	1.30-1.40	.90- .95
Pink, 1 lb. tall.....	1.45-1.50	1.00-1.05
Alaska red:		
1 lb. tall.....	2.25-2.35	1.85-1.95
1 lb. flat.....	2.50	2.20
Coho or medium red:		
1 lb. tall.....	1.85-1.90	1.60
1 lb. flat.....	2.20-2.30	1.85
Puget Sound sockeye, 1 lb. flat....	3.50	3.00

More Shrimp Being Packed This Year

From July 1 to December 23 the 40 canneries packing shrimp in the Gulf and South Atlantic States, under the supervision of the Seafood Inspection Service of the Food and Drug Administration, have packed 1,048,000 standard cases as compared, for similar periods, with 948,000 cases in 1938, 1,073,000 cases in 1937, and 761,000 cases in 1936, according to the Jacksonville Fishery Market News Service. Less than 10,000 cases were packed in the week ending December 23. Of the current total, 179,000 cases consisted of the dry pack in 5-ounce tins; 824,000 cases of the wet pack in 5 3/4-ounce tins; and the remainder were packed in miscellaneous odd sizes, 21,000 cases of which were in glass containers. More than 56 millions of pounds of raw shrimp have been used for canning since July 1.

California Sardine Pack Up

The pack of sardines in California during November amounted to 734,000 cases of 48 one-pound cans, according to a report prepared by the Division of Fish and Game of California.

November's output brings the total for the first three months of the current season, which began in September, to 1,286,000 cases--an increase of 31 percent over the season's pack through November a year ago. The pack for this season thus far in the Monterey district amounted to 933,000 cases; the San Francisco district, 151,000 cases; and the Southern California district, 202,000 cases. The entire pack in the latter district was produced during November.

California Produces Record Tuna Pack

The pack of canned tuna and tunalike fishes in California during the first 11 months of 1939 amounted to 3,232,000 cases of 48 half-pound cans, according to preliminary data released by the California Division of Fish and Game. The output thus far this year has exceeded by 3 percent the record complete year's pack of 3,145,000 cases produced in 1937. The pack during 1938 for the first 11 months had aggregated 2,606,000 cases and that for the calendar year 2,754,000 cases. The larger pack in 1939 was accounted for chiefly by the increase in the pack of yellowfin tuna from 1,161,000 cases in 1938 to 1,804,000 cases for the first 11 months of 1939. Yellowfin tuna has furnished the raw material for 56 percent of the current year's pack to date; striped tuna, 14 percent; albacore, 12 percent; bluefin tuna, 7 percent; bonito, 6 percent; tuna flakes, and tuna, tonno style, each 2 percent; and yellowtail, 1 percent.

Preliminary figures show that the tuna pack in the San Pedro district aggregated 1,603,000 cases; the San Diego district, 1,600,000 cases; and the Monterey district, 29,000 cases.

California Mackerel Pack Shows Small Increase

The pack of canned mackerel in California amounted to 779,000 cases of 48 one-pound cans during the first 11 months of 1939, according to preliminary figures prepared by the Division of Fish and Game of the State of California. The current year's pack represents an increase of 2 percent as compared with the pack for the same period in the preceding year. The pack in the San Pedro district accounted for 93 percent of the season's total, only small quantities being canned in the San Diego and Monterey districts.

The Bureau's agent in California reported late in December that the total 1939 pack will probably exceed 1,000,000 cases.

FOREIGN TRADE IN FISHERY PRODUCTS DOWN

November was the first month in 1939 in which the imports of edible fishery products were less than in the corresponding month of 1938, according to data compiled by the Bureau of Foreign and Domestic Commerce. Imports of such commodities during November 1938 amounted to 28,350,000 pounds--14 percent less than during the same month of the preceding year. Included among the more important fishery commodities imported during November were salted groundfish, 5,511,000 pounds; fresh-water fish and eels, 4,251,000 pounds; salted herring, 2,566,000 pounds; crab meat, 2,460,000 pounds; canned sardines, 2,405,000 pounds; and canned tuna, 919,000 pounds. Among these commodities, canned tuna and crab meat were the only commodities to show increased imports over the same month in the preceding year; however, the increase in the instance of crab meat amounted to 1007 percent, the imports in November 1938 amounting to only 222,000 pounds.

The total domestic imports of edible fishery products for the first 11 months of 1939 amounted to 319,973,000 pounds, representing an increase of 16 percent over the quantity imported during the same period of 1938. Included among the items received in greater quantities for the first 11 months of 1939 than for the same period of 1938 were salted groundfish, 49,405,000 pounds, an increase of 7 percent; fresh-water fish and eels, 46,252,000 pounds, an increase of 4 percent; canned sardines, 30,182,000 pounds, an increase of 52 percent; crab meat, 12,383,000 pounds, an increase of 64 percent; lobster (not canned), 13,622,000 pounds, 6 percent; and canned tuna, 9,468,000 pounds, an increase of 38 percent. Imports of salted herring amounting to 25,213,000 pounds showed a decrease of 15 percent for the 11 months.

Domestic exports of edible fishery products during November 1939 amounted to 12,117,000 pounds, which was a decrease of 10 percent as compared with the exports in November 1938. Most of the November exports consisted of canned sardines, 7,328,000 pounds, representing an increase of 29 percent over the same month in 1938, and canned salmon, 2,985,000 pounds, a decrease of 35 percent.

Exports for the first 11 months of 1939 of all edible fishery products amounted to 113,274,000 pounds, an increase of 8 percent over the same period of 1938. Exports of canned sardines during this period accounted for 50,626,000 pounds, and canned salmon, 38,234,000 pounds.

NEWFOUNDLAND EXPORTS OF LIVE LOBSTERS UP

Exports of live lobsters from Newfoundland during 1939 amounted to 2,291,000 pounds, as compared with 1,385,000 pounds in the preceding year, according to information supplied by the American Consulate General at St. John's and published in "Foodstuffs Round the World". Shipments to the United States accounted for most of this increase, exports in 1938 amounting to 963,000 pounds and in 1939, nearly 1,709,000 pounds. The remainder of the exports in both years was consigned to Canada. This increase in the export shipments was evidenced in spite of the decrease in the catch of lobsters by more than a million pounds from 3,886,000 pounds in 1938 to 2,751,000 pounds in 1939. The additional supplies for foreign shipment were provided by a decrease in the lobsters used for canning from 2,500,000 pounds in 1938 to an estimated 460,000 pounds in 1939.

THE COVER PAGE

Shrimp ranks seventh in volume and fifth in value among all species of edible seafoods taken in the commercial fisheries of the United States and Alaska. The shrimp catch in a recent year aggregated 143,000,000 pounds with a value to the fishermen of more than $5,000,000. The South Atlantic and Gulf States alone contributed 99 percent of both this volume and value. Nearly one-half of the annual catch is canned for sale in this country and abroad; about one-third is beheaded and marketed fresh; and smaller quantities are marketed as sun-dried, frozen-packaged, fresh-packaged, or cooked and peeled shrimp.

The cover page for this month shows craft trawling for shrimp in Barataria Bay in Louisiana. This method for capturing shrimp, which is similar to that used for finny fish on the banks of the North Atlantic by larger vessels, accounts for about 95 percent of the total domestic shrimp catch.

FISHERY TRADE INDICATORS
(Expressed in Thousands of Pounds)

Item	Month	Latest month	Same month a year ago	Previous month
FRESH FISH LANDINGS				
Boston, Mass.	November	23,599	23,557	22,730
Gloucester, Mass.	do	7,959	6,244	7,462
Portland, Me.	do	1,121	1,484	1,642
Boston, Gloucester, and Portland:				
Cod	do	9,556	7,794	4,356
Haddock	do	6,012	7,609	10,920
Pollock	do	8,136	7,987	767
Rosefish	do	5,067	3,940	8,373
Pacific Coast:				
Halibut, North Pacific ports	do	173	863	3,581
Halibut, Seattle	do	173	770	2,585
FISH RECEIPTS, CHICAGO 1/				
Salt-water fish	do	1,189	723	1,620
Fresh-water fish	do	2,757	2,101	2,784
Shellfish, etc.	do	1,302	632	1,254
By truck	do	1,695	1,450	1,724
By express	do	1,554	1,124	2,202
By freight	do	2,000	882	1,733
COLD-STORAGE HOLDINGS 2/				
New York, N. Y.:				
Salt-water fish	December	5,018	4,540	4,754
Fresh-water fish	do	2,756	2,164	2,692
Shellfish, etc.	do	1,989	2,538	2,006
Boston, Mass.:				
Salt-water fish	do	13,448	15,514	12,214
Fresh-water fish	do	48	47	34
Shellfish, etc.	do	1,308	1,170	1,404
Chicago, Ill.:				
Salt-water fish	do	1,631	1,344	1,515
Fresh-water fish	do	3,324	2,674	3,489
Shellfish, etc.	do	1,070	1,377	690
Unclassified	do	580	838	170
United States:				
Cod fillets	do	2,970	1,876	1,993
Haddock fillets	do	6,390	6,167	7,178
Halibut	do	7,507	9,645	9,450
Mackerel	do	6,457	4,801	5,434
Pollock fillets	do	4,808	4,738	1,099
Rosefish fillets	do	3,363	1,782	3,381
Salmon	do	7,468	13,191	7,771
Whiting	do	8,853	8,228	8,705
Shrimp	do	4,784	5,548	3,427
New England, all species	do	29,353	25,600	26,144
Middle Atlantic, all species	do	16,941	14,545	14,833
South Atlantic, all species	do	5,450	4,275	4,402
North Central East, all species	do	15,245	12,692	13,056
North Central West, all species	do	5,465	4,964	4,079
South Central, all species	do	2,953	2,458	2,209
Pacific, all species	do	17,310	26,177	19,782
FOREIGN FISHERY TRADE 3/				
Exports:				
All edible fishery commodities	November	12,117	13,407	18,512
Canned salmon	do	2,985	4,607	5,829
Canned sardines	do	7,328	5,689	10,349
Canned shrimp	do	437	696	779
Imports:				
All edible fishery commodities	do	28,350	32,802	35,937
Fresh-water fish and eels, fresh or frozen	do	4,251	4,318	5,326
Canned tuna	do	919	492	925
Canned sardines	do	2,405	2,524	5,108
Cod, haddock, hake, etc., pickled or salted	do	5,511	6,690	7,672
Herring, pickled or salted	do	2,566	6,402	2,378
Crab meat, sauce, etc.	do	2,460	222	1,689
Lobsters, not canned	do	288	428	297
Lobsters, canned	do	82	15	77

1/ Includes all arrivals as reported by express and rail terminals, and truck receipts as reported by wholesale dealers, including smokers.

2/ Data for individual cities are as of the last Thursday of the month, except those at Boston which are for the last Wednesday of the month, and those for geographical areas and the total of the United States which are as of the 15th of the month.

3/ From data compiled by the Bureau of Foreign and Domestic Commerce.

Note.-Data for the latest month are subject to revision.

PRINCIPAL FIELD OFFICES AND LABORATORIES
OF THE U. S. BUREAU OF FISHERIES

Division of Fishery Industries

Boston, Mass.	B. E. Lindgren.....	253½ Northern Ave. Market News Service.....
Chicago, Ill.	E. C. Hinsdale.....	200 N. Jefferson St. Market News Service.....
College Park, Md.	J. M. Lemon.....	Horticultural Bldg., U. of Md. Fish. Tech. Laboratory....
Jacksonville, Fla.	S. C. Denham.....	309 Duval Bldg. Market News Service.....
New York, N. Y.	W. H. Dumont.....	33-A Fulton St. Market News Service.....
San Pedro, Calif.	C. B. Tendick.....	Post Office Bldg. Fishery Statistics.....
Seattle, Wash.	V. J. Samson.....	421 Bell St. Terminal. Market News Service.....
Seattle, Wash.	R. W. Harrison.....	2725 Montlake Blvd. Fisheries Tech. Laboratory.....

Division of Fish Culture

LaCross, Wis.	C. F. Culler.....	District Headquarters.....
Seattle, Wash.	F. J. Foster.....	2725 Montlake Blvd. Regional Headquarters.....

Division of Scientific Inquiry

Ann Arbor, Mich.	Dr. John Van Oosten.....	University Museums. Great Lakes Fish. Investigations
Beaufort, N. C.	Dr. Herbert F. Prytherch...	Fisheries Biological Laboratory.....
Cambridge, Mass.	W. C. Herrington.....	Room A-210 Harvard Biol. Lab. N.At.Fish. Investigations
College Park, Md.	Robert A. Nesbit.....	Horticultural Bldg., U. of Md. Mid. & S. At. Fish. Invest.
Columbia, Mo.	Dr. M. M. Ellis.....	101 Willis Ave. Interior Waters Investigations.....
Milford, Conn.	Dr. Victor Loosanoff.....	New England Oyster Investigations.....
New Orleans, La.	M. J. Lindner.....	336 Chartres St. Gulf Shrimp Investigations.....
Pensacola, Fla.	Dr. A. E. Hopkins.....	Box 1826. Gulf Oyster Investigations.....
Seattle, Wash.	Dr. F. A. Davidson.....	2725 Montlake Blvd. Fisheries Biological Laboratory.
Stanford University, Calif.	O. E. Sette.....	Room 450-B Jordan Hall. Pilchard Investigations.....

Division of Alaska Fisheries

Juneau, Alaska.....	C. L. Olson.....	Federal Bldg. Alaska Fisheries Service.....
Seattle, Wash.	J. Steele Culbertson.....	706 Federal Bldg. Alaska Fisheries Service.....

FISHERY INDUSTRIAL AND MARKETING PUBLICATIONS

There follows a list of some of the industrial or marketing publications of the Bureau of Fisheries, which are available for purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices quoted. Price List 21, which includes a complete list of the available publications of the Bureau, may be obtained from the Superintendent of Documents, free of charge.

INVESTIGATIONAL REPORTS

No. 43. Some Effects of Ultraviolet Irradiation of Haddock Fillets. 1939. 5¢.

No. 42. A Plan for the Development of the Hawaiian Fisheries. 1939. 10¢.

No. 41. The Mineral Content of the Edible Portions of Some American Fishery Products. 1938. 5¢.

No. 40. Pacific Salmon Oils. 1939. 5¢.

No. 39. Trade in Fresh and Frozen Fishery Products and Related Marketing Considerations in the San Francisco Bay Area. 1938. 10¢.

No. 38. Marketing of Shad on the Atlantic Coast. 1938. 10¢.

No. 37. Preliminary Report on the Cause of the Oyster Industry of the York River, Va., and the Effects of Pulp-mill Pollution on Oysters. 1938. 10¢.

No. 32. Studies on Drying Cod and Haddock Waste. 1935. 5¢.

No. 30. Effect of Manufacture on the Quality of Nonoily Fish Meals. 1935. 5¢.

No. 28. Studies on the Utilization of Swordfish Livers. 1935. 5¢.

No. 26. Fishery for Red Snappers and Groupers in the Gulf of Mexico. 1935. 5¢.

No. 25. The Iodine Content of Some American Fishery Products. 1935. 5¢.

No. 24. Modifications in Gear Curtail the Destruction of Undersized Fish in Otter Trawling. 1935. 5¢.

No. 21. Shrimp Industry of the South Atlantic and Gulf States. 1934. 10¢.

No. 20. Studies on the Smoking of Haddock. 1934. 5¢.

No. 18. The Iodine Content of Oysters. 1934. 5¢.

No. 16. Developments in Refrigeration of Fish in the United States. 1932. 5¢.

No. 14. Fisheries of the Virgin Islands of the United States. 1932. 5¢.

No. 13. Fisheries of Puerto Rico. 1932. 5¢.

No. 7. Market for Marine Animal Oils in the United States. 1931. 15¢.

No. 1. Menhaden Industry. 1931. 25¢.

FISHERY CIRCULARS

No. 25. Natural History and Methods of Controlling the Common Oyster Drills. 1937. 5¢.

No. 23. Decline in Haddock Abundance on Georges Bank and a Practical Remedy. 1936. 5¢.

No. 22. Organizing and Incorporating Fishery Cooperative Marketing Associations. 1936. 5¢.

No. 21. The Story of Oysters. 1936. 5¢.

No. 19. Practical Fish Cookery. 1935. 5¢.

No. 18. Conditions Affecting the Southern Winter Trawl Fishery. 1935. 5¢.

No. 15. Aquatic Shell Industries. 1934. 5¢.

No. 12. Introduction of Japanese Oysters into the United States. 1932. 5¢.

No. 11. Some Unusual Markets for Fish and Shellfish. 1932. 5¢.

No. 3. Market for Fresh Oysters in 14 Cities of the United States. 1931. 10¢.

ECONOMIC CIRCULARS

No. 74. Application of Preservatives to Fishing Nets. 1931. 5¢.

No. 69. Salmon--an Economical and Valuable Food. 1929. 10¢.

DOCUMENTS

No. 1092. Pacific Salmon Fisheries. 1930. 65¢.

No. 1078. Utilization of Shrimp Waste. 1930. 10¢.

No. 1075. Net Preservative Treatments. 1930. 5¢.

No. 1065. Bibliography on Cod-liver Oil in Animal Feeding. 1929. 10¢.

No. 1059. Fishing Grounds of the Gulf of Maine. 1929. 25¢.

ADMINISTRATIVE REPORTS

No. 34. Propagation and Distribution of Food Fishes, Fiscal Year 1938. 10¢.

No. 32. Fishery Industries of the United States, 1937. 25¢.

No. 31. Alaska Fishery and Fur-seal Industries in 1937. 25¢.

No. 35. Progress in Biological Inquiries, 1938. 15¢.

ORDERS FOR THE ABOVE-LISTED PUBLICATIONS SHOULD BE FORWARDED DIRECT TO THE SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C., AND NOT TO THE BUREAU OF FISHERIES

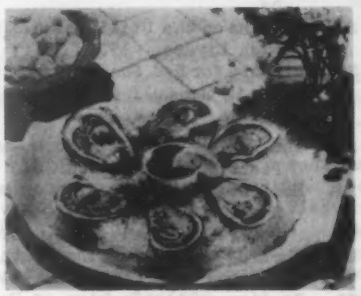
THE STORY OF OYSTERS

Fishery Circular No. 21

"Nineteen centuries before the Walrus and the Carpenter in 'Alice in Wonderland' made their feast on oysters from the briny deep, the Romans in their banquet halls were singing the praises of oysters in poems, and other Romans were divided among themselves as to which were the best oysters--those which were carried back from Britain by the conquering Roman Legions, or those from Lake Lucrinus, the home of the famous Roman oyster."

The above, which is quoted from the booklet entitled "The Story of Oysters", by R. H. Fiedler of the U. S. Bureau of Fisheries, gives evidence of the many centuries during which the oyster has been prized as a food.

Beginning with the current month, retail seafood markets and many restaurants are again featuring the oyster. The season for this delectable and highly nutritious mollusk opened on September 1 and will continue through April.



The oyster is admirably adapted to numerous methods of preparation for the table. A few of the savory dishes which include oysters are: Pigs in Blanket, Baked Oysters with Cheese, Toasted Oyster Loaf, Sherried Oysters on Toast, and Oyster Paddies. "The Story of Oysters" includes recipes for these and thirty other unusual as well as common oyster dishes. The booklet also includes sections on the biology of the oyster, oyster culture, oyster enemies, the oyster fishery and industry, sanitary regulations, and food value of oysters.

The complete report may be obtained for five cents from the Superintendent of Documents, Government Printing Office, Washington, D. C., by requesting Fishery Circular No. 21. If purchased in quantities of 100 or more, a discount of 25 percent is allowed.